Instructional Approaches to Critical Thinking: An Overview of Reviews

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Abstract

Recent research has started to explore how different instructional approaches can foster the development of critical thinking across various disciplines in different stages education. Critical thinking is a controversial issue, in terms of definition and development, so researching it never stops. This overview aimed to explore the different instructional approaches to critical thinking to do date; how they affect the development of critical thinking; and how frequent they are used. Six approaches – dispositions, general, infusion, immersion, mixed, and holistic, were overviewed in seven reviews. The overview presented a table summarizing the findings of the reviews of instructional approaches to critical thinking in terms of the number of reviewed studies, the types of participants, and the different approaches to critical thinking: effectiveness and frequency of use. The overview came to certain conclusions. This immersion approach has the least effect and the most frequently used. The mixed approach is the most effective one and it the least frequently used. The longer the exposure is to one single approach, the more effective the approach is found to be. Further research is needed to settle the controversial issues discussed in the article.

Keywords: Instructional Approach; Critical Thinking; Overview; Review; Frequency of Use, Effectiveness

1. Introduction

There are various instructional interventions to teaching critical thinking. They include generic, infusion, immersion and mixed approaches (Ennis, 1989), together with dispositions, and holistic approaches. These approaches are mirrored in the literature on teaching critical thinking. These six approaches: general, infusion, and immersion, mixed, dispositions, and holistic will be assessed in this overview for their instructional efficacy. The debate of teaching or not teaching critical thinking is not included in this article. Hence, this article is for teaching critical thinking. It seeks the different instructional approaches covered in various reviews of critical thinking. It provides a comprehensive map of the instructional approaches to critical thinking up to date. It gives a detailed table of comparing these six instructional approaches in terms of the number of studies covered, the type of participants, the frequency of use, the appropriateness, the effect, the length of exposure.

Many definitions of critical thinking were offered. One prominent definition of it offered by Facione (1990, 2); it is a "purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based." While scholars in the Critical Thinking Movement have done much to advance the cause of thinking within contemporary education, it needs to be noted that their ideas have not been fully embraced by all; indeed, many of the ideas they advance have become the object of the same kind of critical scrutiny that they typically advocate for all other fields of inquiry. A number of criticisms have been made. One of these concerns the multiplicity of definitions that have emerged from the movement's ranks. While considerable intellectual effort has gone into this enterprise (Facione, 1990), it is not altogether clear that out of these processes, the concept has ended up being a substantially clearer one. Some critics have gone so far as to suggest that all this definitional work from within the movement has only managed to make the idea of critical thinking more confusing than it once was (Capossela, 1993, 1).

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2. Study problem

Although researchers have not agreed on how critical thinking should be conceptualized, advocates of teaching it have often conceived of it as a cognitive skill that can be taught (Davidson, 1998; Sobkowiak, 2016). Recent research has started to explore how different pedagogical practices can foster the development of critical thinking across various disciplines in different stages education (Chaplin, 2007; Kaddoura, 2011; Holmes, Wieman, & Bonn, 2015). The lack of consensus on how critical thinking should be taught in various stage education supports the need for further research (Saeger, 2014).

3. The need for this research

Critical thinking is a controversial issue, in terms of definition and development, so researching it never stops. Many studies were done on it in terms of seeking the most appropriate instructional approaches of developing it, as it is one of the skills of the twenty first century. Many approaches to critical thinking were examined, yet different results are offered now and again. This necessitates researching critical thinking once again to update thinking on instructional approaches to critical thinking.

4. Main research questions

The article tries to answer the following questions:
1. What are the different instructional approaches to critical thinking?
2. How do they affect the development of critical thinking?
3. How frequent are they used?
4. What type of participants in the reviews?
5. How many studies are examine in each review?

5. Approaches to critical thinking

Many approaches to critical thinking instruction were provided based on various perspectives to the position of critical thinking. Glaser (1941) wondered that if critical thinking has aspects that are properly regarded as skills-based, do these skills represent generic traits and skills or are they context-bound? The matter has not been settled yet. Glaser's wonder is repeated by Ennis (1989) that there is little consensus about whether critical thinking is a set of generic skills that apply across subject domains (such as engineering, language instruction and science) or depends on the subject domain and context in which it is taught. Following is the classification of the different approaches to critical thinking.

- **Dispositions approach**

Although being a good thinker means having certain types of critical thinking and creative ability, the reality is that ability alone is not enough and good thinkers must have motivation, attitudes, values and habits in addition to abilities (Tishman & Andreade, 1995). In considering how to teach thinking dispositions, it is important to note that each class has a culture that explicitly and implicitly give messages to students. Scholars have emphasized that the individuals' actions including their intellectual actions typically is related to their context and in schools like any other places, learners tend to act so that it fits their environment (Perkins, 1992). It can be said that enculturation is suitable pattern to improve students' thinking dispositions (Costa, 1991). Students need to feel the actual effect of thinking in their life.

The literature on critical thinking insists that students need more than skills: they need to understand the value of critical thinking and have an interest in and enthusiasm for applying it. While the skills of critical thinking can be expressly taught, dispositions need to be modelled and nurtured so that students increasingly adopt an identity as critical thinkers. Students can be better motivated to participate in critical thinking on topics that they can relate to and if they are given adequate scaffolding. This will allow them to experience the intrinsic rewards of critical thinking.

- **Generic/ general/ enrichment approach**

This approach may be called an enrichment approach in which lessons are designed beforehand and are taught parallel with the existing curriculum to develop general thinking skills. Enrichment is one of the oldest and the most experienced approaches for teaching thinking (Sedaghat & Rahmani, 2011). The general approach focuses on teaching critical thinking, on forming critical thinking apart from the specific content of subject matters.

Prevailing psychological opinions tend to favor the generic traits approach; learning to think critically is understood as gaining mastery over a significant series of discrete skills or mental operations and dispositions that can be generalized across a variety of contexts. These skills include concepts such as interpreting, predicting, analyzing, and evaluating. According to Woolfolk (1998), higher order thinking such as critical thinking requires consciously applying abstract knowledge, heuristics, or procedures learned in one context to some novel circumstance or situation. If critical thinking is generic, then it could be effectively taught in specialized courses that focus on critical

thinking skills (Sá, Stanovich, & West, 1999). In the general approach, critical thinking is taught without specific subject matter content.

Willingham (2007) and Morgan (2001) question whether it is possible to teach critical thinking. Willingham argues that critical thinking cannot be taught, especially when it is presented out of context and when students do not possess the necessary command of the subject matter. Decades of cognitive research point to a disappointing answer: not really.

Research from cognitive science shows that critical thinking is not that sort of skill. The processes of thinking are intertwined with the content of thought (domain knowledge). Thus, if you remind a student to "look at an issue from multiple perspectives" often enough, he will learn that he ought to do so, but if he doesn't know much about an issue, he can't think about it from multiple perspectives (Willingham, 2007, p. 10).

Willingham argues that students generally need to have developed thorough knowledge of an issue before they are able to evaluate, question, and examine it from different angles. In other words, without domain knowledge, students would be unable to implement their critical skills effectively, whether they are native speakers or non-native speakers of English. The more exposure and practice students receive in one academic area, the better they are equipped to use their critical thinking skills effectively in that area alone without necessarily being able to transfer those skills to other areas.

- **Infusion approach**

Content is important in the infusion approach. Critical thinking is an explicit objective in the infusion course. The infusion of critical thinking requires deep, thoughtful, and well-understood subject matter instruction in which students are encouraged to think critically in the subject. Additionally, general principles of critical thinking skills and dispositions are made explicit (Abrami et al., 2014). It presupposes the encouragement of students to think critically within each subject matter in which the general principles of critical thinking are explicitly formulated.

- **Immersion approach**

Content is important in the immersion approach. Critical thinking is not an explicit objective in the immersion course. In the immersion approach, subject matter instruction is thought provoking, and students are immersed in the subject. In contrast to the infusion approach,

general CT principles are not made explicit (Abrami et al., 2014). Students are immersed in the respective domain without being specifically referred to the principles of critical thinking. Students taught with the immersion approach are not aware of that they are being trained to think critically.

- **Mixed approach**

In the mixed approach, critical thinking is taught as an independent track within a specific subject content course. The mixed approach consists of a combination of the general approach with either the infusion or immersion approach. Under it, students are involved in subject-specific critical thinking instruction, but there is also a separate thread or course aimed at teaching general principles of critical thinking (Abrami et al., 2014).

- **Holistic approach/ Whole academic degree program**

The whole academic degree program investigates effects of entire degree programs on the development of critical thinking skills (Behar-Horenstein & Niu, 2011; Niu, Behar-Horenstein, & Garvan, 2013). Niu et al. (2013) considered whole academic degree program as "holistic approach". It normally lasts for at least one year, even more than two or three years. The approach mostly uses pretest and posttest to measure the utility or efficiency of an academic program in the development of critical thinking. Researchers admit that length of programmatic approach, another threat to validity, is an intervening factor, which poses some confounding effects on the consequence of the program. Behar-Horenstein and Niu (2011) pointed out that, among these studies on it, few have made efforts to address these threats in programmatic intervention. In spite of these defects inherent in instructional program, it is undeniable that, to a certain extent, these studies suggest a positive effect of programmatic intervention in critical thinking development. Behar-Horenstein and Niu (2011) indicated, many of the studies reported change in students' critical thinking, but they were unable to determine factors that have led to such change, or to establish causality. Hence, it is preferable for future studies, making use of the holistic approach/ whole academic degree program, to consider this remark.

6. Comparing approaches

Certain studies focused on conducting reviews of instructional approaches to critical thinking, starting from 2008 to 2018. Abrami et al. (2008)

carried out the first review, whereas Tiruneh, De Cock and Elen (2018) made the last one. Following is an overview of these reviews.

Abrami et al. (2008) conducted a meta-analysis of instructional interventions affecting critical thinking skills with 117 empirical studies published from 1960s through 2005 and found that the mixed approach outperforms and the immersion underperforms the other three instructional approaches significantly. General approach and infusion are found to have moderate effects. Infusion and immersion are employed more frequently than the other two approaches.

Tilbury, Osmond and Scott (2010) reviewed the literature on teaching critical thinking in social work and human services education. The research suggests critical thinking should be taught in both explicit and disciplinary-specific ways. Mixed instructional approaches that combine specific instruction about critical thinking, with application to course or unit content, appear to be the most effective. Tasks that require students to 'critically analyse' or 'critically discuss' issues should be accompanied by explicit and detailed guidance about the meaning of these terms.

Behar-Horenstein and Niu (2011) reviewed 61 empirical studies published from 1994 to 2009, which focused on the improvement of college students' critical thinking skills through instructional interventions. They found that the first frequently used approach (52% of the studies reviewed) is immersion; the second one is holistic approach (19%), and the other three approaches (general, infusion, mixed) have an equal rank as the third (each 9.5%). Immersion is reported to yield lowest growth of students' critical thinking out of all the approaches.

Sedaghat and Rahmani (2011) conducted a review of approaches to teaching thinking in terms of appropriate approach for Iran education system. By considering Iran's educational system needs and situations, thinking dispositions approach seems as the most suitable approach and enculturation of thinking is the most appropriate method for teaching thinking especially in elementary schools.

In another meta-analysis of effects of instructional interventions on college students' critical thinking skills, in which immersion is the first frequently used approach and holistic approach is second, Niu et al. (2013) found that a single intervention longer than 12 weeks is more effective than single interventions shorter than 12 weeks or the holistic approach. It can be inferred from such

findings that the effect of a single intervention is confounded with length of exposure to that intervention. The longer exposure to a single intervention, the more effective such single intervention is.

Based on an overview on teaching approaches to critical thinking, Wang (2017) concluded that among instructional approaches to critical thinking, immersion, which is used most frequently, has the smallest effect. Holistic approach also has a small effect, though better than immersion. Mixed approach is reported to be most effective in improving students' critical thinking ability. General approach and infusion both have a moderate effect. Another finding is that effect of a particular approach is influenced by length of exposure to the approach. The longer the exposure is to one single approach, the more effective the approach is found to be. Although, the duration of 12 weeks was found to be a determinant of effects of a single approach, it is not reasonable to make a conclusion that the length of exposure of at least 12 weeks is a threshold for effects of a single approach.

Tiruneh, De Cock and Elen (2018) pointed out that despite the large body of research on this topic, there has been little consensus on how educators best support the development of critical thinking. In view of some of the controversies surrounding the teaching of critical thinking skills in higher education, this study examined the effects of embedding critical thinking instruction systematically in domain-specific courses (Immersion vs. Infusion) on the acquisition of domain-specific and domain-general critical thinking skills and course achievement. First-year university students (N = 143) enrolled in an introductory physics course were assigned to one of three instructional conditions: Immersion, Infusion, and control. The Immersion and Infusion conditions followed lessons designed systematically based on the First Principles of Instruction model, whereas the control condition followed a regular instruction. Results showed that participants in the Immersion and Infusion conditions significantly outperformed those in the control condition on domain-specific critical thinking proficiency and course achievement.

The following *Table 1* summarizes the findings of the reviews of instructional approaches to critical thinking in terms of the number of reviewed studies, the types of participants, and the different approaches to critical thinking: dispositions, general, infusion, immersion, mixed, and holistic.

Table 1. **Summary of the reviews of approaches to critical thinking**

Study	No. of reviewed studies	Participants	Approaches					
			Dispositions	General/Generic/ enrichment	Infusion	immersion	Mixed	Holistic approach / Whole academic degree program
1. Abrami et al. (2008)	117	No younger than 6 years old	Not included	Moderate effect		Underperforms the others	Outperforms the others	Not included
						Employed more frequently than the others		
2. Tilbury, Osmond & Scott (2010)	No mention	College students	Not included	Not included	Mixed is the most effective			Not included
3. Behar-Horenstein and Niu (2011)	61	College students	Not included	3rd frequently used		1st frequently used, least effective	3rd frequently used	2nd frequently used
4. Sedaghat & Rahmani (2011)	Not mention	Not mention	Most suitable approach in Iran	Not effective		Not included		
5. Niu et al. (2013)	31	College students	Not included			1st frequently used, least effective		2nd frequently used
				The longer exposure to a single intervention, the more effective such single intervention is.				
6. Wang (2017)	No mention	Not mention	Not included	Moderate effect		Most frequently used, but has the smallest effect	Most effective	Better than immersion
				The longer the exposure is to one single approach, the more effective the approach is found to be				
7. Tiruneh, De Cock & Elen (2018)	No mention	College students	Not included	Infusion and Immersion approaches outperform the general approach in terms of proficiency and achievement		Not included		

In order to provide clear and specific information about the reviews, the reviews should have mentioned the number of the reviewed studies, such as Tilbury, Osmond and Scott (2010), and Sedaghat & Rahmani (2011).

Concerning the type of participants, four reviews out of seven were conducted on college students. Abrami et al. (2008) review was carried out on various stages of education: from primary to college. This means that critical thinking can be implemented at various stages of education, and not only at college stage, provided that it is adapted and adjusted to the concerned stage under study. Nevertheless, critical thinking was implemented mainly at the college stage. This remark indicates that, for further research, critical thinking has to be tried in different stages of education other than college stage.

The six approaches – dispositions, general, infusion, immersion, mixed, and holistic, are not included in each review. Each review deals with certain approaches to critical thinking. As a whole, the seven studies of reviews covered the six approaches. These approaches are for putting critical thinking into consideration in education. Four approaches – general, infusion, immersion, and mixed - are for teaching critical thinking, but differently. Dispositions approach to critical thinking means that the ability to think critically alone is not enough and good thinkers must have

motivation, attitudes, values and habits in addition to abilities. The holistic approach mostly uses pretest and posttest to measure the utility or efficiency of an academic program in the development of critical thinking.

Only one review, Sedaghat and Rahmani (2011), included dispositions approach in search for the most suitable approach in Iran. This review compared general, infusion and dispositions approaches. The review concluded that thinking dispositions approach seems as the most suitable approach in Iran.

As for the general approach, it was included in six reviews out of seven. Abrami et al. (2008) and Wang (2017) agree that it has a moderate effect while Sedaghat and Rahmani (2011) found it nor effective for the Iranian context. In terms of frequency of use, Behar-Horenstein and Niu (2011) found it the third frequently used approach, following immersion and holistic approaches.

Regarding the infusion approach, Abrami et al. (2008) and Wang (2017) agree that it has a moderate effect while Sedaghat and Rahmani (2011) found it nor effective for the Iranian context. In terms of frequency of use, it is employed more frequently than general, immersion and mixed approaches according to Abrami et al. (2008) review. Based on Tiruneh, De Cock and Elen (2018) review, infusion and immersion approaches outperform the general approach in terms of proficiency and achievement.

With respect to the immersion approach, it underperforms other approaches (Abrami et al., 2008; Tiruneh, De Cock & Elen, 2018; Wang, 2017; Behar-Horenstein and Niu, 2011). Respecting frequency of use, Behar-Horenstein and Niu (2011), Niu et al. (2013) and Wang (2017) agree that it is first frequently used approach. This is surprising to find an approach to have the least effect and the most frequently used.

As to the mixed approach, it is the most effective approach (Abrami et al., 2008, Tilbury, Osmond & Scott, 2010; Wang, 2017). Behar-Horenstein and Niu (2011) found it the least frequently used. This is surprising to find an approach to have the most effect and the third frequently used.

As for the holistic approach, it was included in three reviews out of seven. Behar-Horenstein and Niu (2011) and Niu et al. (2013) agree that is the second frequently used approach. Wang (2017) found it better than the immersion approach.

Overall, Niu et al. (2013) and Wang (2017) agree that the longer the exposure is to one single approach, the more effective the approach is found to be.

8. Conclusion

Critical thinking is problematic in many ways, either in its definition or in the instructional approaches to it. This is proved by the reviews of instructional approaches to critical thinking discussed in this article.

Every approach has its own strengths and weaknesses. The most important thing is to use the approach according to the context in which is used. It is worth mentioning that reviewing instructional approaches to critical thinking never stops. These reviews began in 2008, Abrami et al. (2008), and the last one was in 2018, Tiruneh, De Cock and Elen (2018). The reviews differ in certain points that makes it necessary for conducting other reviews based on systematic and accurate criteria to reach sound conclusions. On the other hand, the reviews agree on certain points, which have to be taken into consideration when doing research on instructional approaches to critical thinking.

Further research is needed to settle the controversial issues discussed in this article. These controversies include the highest frequency use of the immersion approach with the least effect. Additionally, the mixed approach has the most effect, with low frequency use.

Further research is needed to explore the effect of the dispositions and holistic approaches on developing critical thinking skills, as they are underrepresented in the studies done on instructional approaches to critical thinking.

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